

What is claimed is:

1. A system for pumping a medical fluid through a line in an infusion pump, the system comprising:

a pumping chamber in the infusion pump comprising:
an inlet in fluid connection with a fluid source; and
a pump outlet;

an inlet sealing member comprising a sealing spring positioned adjacent to an integral support; and

a pump compressing member comprising a return spring positioned adjacent to a distal compressing member support;

wherein during a compressive stroke the pump compressing member is driven towards the pumping chamber and the sealing spring transmits a driving force to the inlet sealing member via the integral support, and

wherein the compressive stroke causes a restriction of retrograde flow of fluid from the pumping chamber through the inlet and causes an increase in pressure within the pumping chamber.

2. A system according to claim 1, further comprising an exit valve outside of the fluid line adapted to control fluid flow through the pump outlet.

3. A system according to claim 2, wherein the increase in pressure within the pumping chamber opens the exit valve and urges fluid from the pumping chamber to the pump outlet.

4. A system according to claim 1, further comprising a driving member that actuates both the inlet sealing member and the pump compressing member.

5. A system according to claim 1, further comprising a force application assembly comprising the inlet sealing member and the pump compressing member.

6. A system according to claim 1, further comprising a driving member that actuates both the inlet sealing member and the pump compressing member

7. A system according to claim 6, wherein the driving member includes a shape-memory actuator.

8. A system according to claim 6, wherein the driving member includes at least one pulley for folding the shape-memory actuator to fit within a reusable portion.

9. A system according to claim 1, wherein the driving member includes a motor.

10. A system according to claim 9, wherein the motor includes a shape-memory actuator.

11. A system according to claim 10, wherein the shape-memory actuator is electrically coupled so as to provide a plurality of electrical paths of different lengths through the shape-memory actuator.

12. A system according to claim 9, wherein the force application assembly includes a pump plate coupled to the driving member for coordinated operation of the inlet sealing member and the pump compressing member.

13. A system according to claim 11, wherein the force application assembly has a normal mode for operating the pumping chamber under normal pumping conditions and a priming mode for priming the pumping chamber, and wherein a shorter electrical path of the shape-memory actuator is used during the normal mode of the force application assembly and a longer electrical path is used during the priming mode of the force application assembly.

14. A system according to claim 9, wherein the motor includes a plurality of shape-memory actuators.

15. A system according to claim 14, wherein the plurality of shape-memory actuators provide for redundant operation of the force application assembly.

16. A system according to claim 14, wherein different numbers of shape-memory actuators are used to provide different actuation forces or stroke lengths.

17. A system according to claim 14, wherein the plurality of shape-memory actuators includes shape-memory actuators of at least two different lengths.

18. A system according to claim 1 further comprising a downstream dispensing assembly in series with the pump outlet, the dispensing assembly comprising a resilient dispensing chamber.

19. A system according to claim 18, further comprising a sensor for measuring a parameter related to flow through the line.

20. A system according to claim 18, further comprising a tortuous high-impedance conduit located downstream of the dispensing assembly.

21. A system according to claim 1 wherein at least a portion of the line is integral to a disposable component, the force application assembly is integral to a detachable reusable component, and the system further comprising a membrane material on the disposable component contiguous to the reusable component.

22. A system according to claim 1, wherein the sealing spring is compressed while the pump compressing member exerts a pumping force upon the pumping chamber.

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